

Appendix 3B

Example of a Structured Aerial Photo Interpretation Data Gathering Protocol

Appendix B: Region One Vegetation Mapping Project Aerial Photo Interpretation Guides.

This appendix includes 3 aerial photo interpretation guides.

The first, commonly called “PI-Heavy”, requires the most detailed photo interpretation. It has been compared to an Ecodata plant-composition plot taken for the entire R1-VMP region-polygon or image object. This detailed photo- interpretation was required for data collected prior to the tree dominance-type and sizeclass classification being complete. See Exhibit 1.

Once the classifications were complete, a second method was developed. Commonly called “PI-Quick”, it allowed for more rapid data collection. A variant of this, called “PI-Fast”, was also used. See Exhibit 2.

An additional method was used. This method was used primarily to evaluate data and derived classification labels “mined” from FSVeg, although it was used for other non-Forest Service data sets as well. This method differs greatly from the other methods. It was developed as a means to quickly generate a large amount of training data by employees relatively unfamiliar with stereoscopic photo interpretation, but who were very familiar forest vegetation within the area. Stand-level and plot-level tree data from a variety of sources were processed to assign a dominance type, sizeclass, and canopy cover class. Processing was through the use of a R-1 “Summary” algorithm and the Forest Vegetation Simulator. These ‘labels’ were joined to a GIS coverage of stands or points. The “interpreter” then overlaid these stand polygons or points and the R1-VMP image objects over a DOQQ and the TM image data in ARCVIEW. They visually inspected individual stands or points and determined if the assigned labels could be applied to one or more of the overlapped image objects. They were instructed to make their judgments to either accept or reject the assigned labels based on their judgment on how well the stands were delineated, the degree of overlap with the image objects, the within-stand heterogeneity as seen on the DOQQ, the number of plots taken in the exam, the year of the exam, evidence of stand-disturbing activities in the TM image or in other ancillary data [such as insect and disease aerial detection surveys] and their general knowledge of the area. While obviously not aerial photo interpretation in the traditional sense, this method is commonly called “PI-Lite”. See Exhibit 3.

Exhibit 4 contains information on some of the techniques used for interpretation of vertical 1:15840 color aerial photography in northern Idaho and western Montana,

Appendix B, PI Guide - Exhibit 1

Northern Region Vegetation Mapping Project Photo Interpretation Data Collection Guide “PI-Heavy”

Version 3.2 Updated 2/26/2003

GENERAL DATA

* denotes primary key in MS Access database.

*Model Number / Forest Number Coverage Name. Column Name: MNFN . 4-digit <ul style="list-style-type: none"> See Appendix A
Photo Interpreter Column Name: PI 3 characters <ul style="list-style-type: none"> Record Photo Interpreter's Initials [either 2 or 3 characters]
*Polygon_link. Column Name: Poly_link . 6-digit. <ul style="list-style-type: none"> Record Polygon_link from the Model / Image Analyst Polygon Coverage. .
Flag Column Name: Flag 1 digit <ul style="list-style-type: none"> 0 = no flag 1 = flag -- discrepancy between photo and TM imagery. <ul style="list-style-type: none"> For example: green, live trees on photo and recent burned or harvest on TM imagery. Make note of condition in General Comments If a poly-link is flagged, it is not photo-interpreted and therefore RPN is not needed. 2 = flag – discrepancy likely between photo and TM imagery due to anticipated insect and pathogen related mortality. See notes on page 20-21. 3-7=reserved flags. 8-9=image analyst flags that can be used at their discretion
*Reference Data Region-Polygon Number. Column Name: RPN . 3-digit <ul style="list-style-type: none"> Consecutive number [1-999] assigned by Image Analyst to those region-polygons selected for photo interpretation If more than 999 region-polygons are PI'd, then create a copy of the Model Number/ Image Analyst Coverage, increment the Model Number [MM] by 50 and start again.
Owner. Column Name: Own . 2-digit. Attributed by GIS routine <ul style="list-style-type: none"> Record 2-digit traditional National Forest identifier or R1-VMP code for 'other ownership' See Appendix B
District. Column Name: Dist . 2-digit Attributed by GIS routine <ul style="list-style-type: none"> Record 2-digit Ranger District identifier for National Forest lands
<ul style="list-style-type: none"> Note: the above numbering convention will also apply to stands selected for field inventory and be used to identify the “Location” in Common Stand Exam and FSveg; and “Setting” in FSveg. See Appendix C for relationships
Region-Polygon Acres. Column Name: Acres . 3-digit. Attributed by GIS routine.
Region Polygon Variability. Column Name: Var . 1 character. <ul style="list-style-type: none"> See Appendix N. This attribute and <u>Region Polygon Acres</u> can be used to determine <u>Number of Sample Plots</u> L – Low M – Mod H – High E – Extreme

Number of Sample Plots. Column Name: **Plots.** 2 characters.

- Populated with update query based Region-polygon Acres and Variability.
- See Appendix N: Sample Size Selection Guide.

Aerial Photo Identification. Column Name: **API.** 17 characters.

- Record the photo that covers the majority of the region polygon. No spaces in code.
 - First six numbers represent Photo Symbol/Project ID
 - Next four numbers represent the roll number
 - Next four numbers represent the exposure number
 - Last three numbers represents the flight line number, use at the discretion of the Image Analyst
- Note: 1, 2 and 3 [14-characters] can be concatenated and crossed-over to FSVEG

Photo Scale: Column Name: **PS** 2 characters

- Record the nominal photo scale using the following convention:
 - 1:16,000 code as 16
 - 1:5,000 code as 5

<p>Inventory Data Type. Column Name: IDT. 2 characters.</p> <ul style="list-style-type: none"> Record the type of data used to assist in the photo interpretation <ol style="list-style-type: none"> No Data R1 Standard Exam or Quick Plot R1 PGP R1 Other R1VMP-CSE field data ECODATA plant comp data ECODATA tree data FIA IPNF CVS IPSAC training data – ground and helicopter Image Analyst Walk-thru, Drive-by Flathead Indian Reservation Nez Perce Indian Reservation GNP Veg Mapping Project BLM FWS Other Federal Montana State Idaho State <p>Note: if multiple data types are available, code the one judged to be 'best'.</p>	<p>Inventory Data Identifier. Column Name: IDI. XX digit.</p> <ul style="list-style-type: none"> Record the stand or plot number associated with the reference data. Format as follows <ul style="list-style-type: none"> 0 NoData FSVeg 14 characters ECODATA XX characters FIA data XX characters IPSAC data XX characters IPNF CVS data XX characters GNP VMP data XX characters Other measured data XX characters Walk-thru, Drive-by Person's Last Name

<p>General Comments – 254 characters max. Record any pertinent <u>general</u> information. Such as: region polygon “delineation” concerns, remarks regarding region polygon variability and how it might affect field sampling, concerns related to Reference Data, etc</p> <p>Note “flag” condition if any discrepancy between aerial photo and TM data. Such as: recent harvest, recently burned area in TM data but not on photos.</p>	
“Standardized Abbreviations”	
CC – Clearcut harvest	BB – General Bark beetle mortality
ST – Seedtree harvest	DFB – Douglas-fir beetle mortality
SW – Shelterwood Harvest	SB – Spruce beetle mortality
PC – Partial Cut/Intermediate harvest/ Salvage	MPB –Mountain pine beetle mortality
	FEB – Fir engraver beetle [GF]
RBL– Recent Burn, Low Severity	WBBB – Western balsam bark beetle [SAF]
RBM– Recent Burn, Mod Severity	DMT – Dwarf mistletoe
RBH– Recent Burn, High Severity	WPBR - White pine blister rust
	RR – Root rot mortality
IS – Ice Storm damage	
WET – Wetland area	EDGE – contains high contrast edge between lifeform. Edge of a clearcut/timbered area
RIP – Riparian area	

LIFEFORM DATA

***Lifeform** Column Name: **LF**. 3-characters.

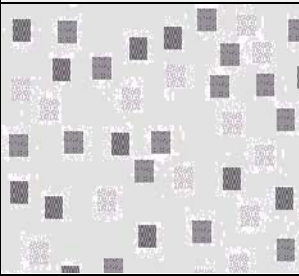
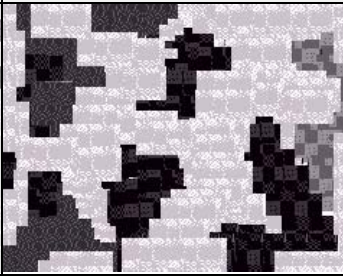
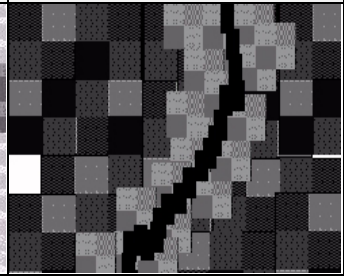
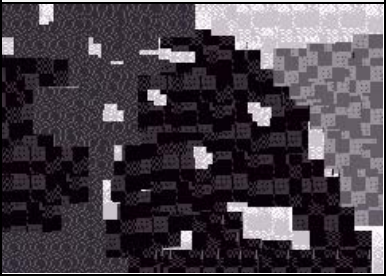
- **TRE**– Areal Extent of Tree Cover Classes
 - (Note: Dead trees and logs are not included in total tree cover)
- **SHR** – Areal Extent of Shrub Cover Classes
- **GFB** – Areal Extent of All Grass, All Forb, All Moss, All Lichen Cover Classes
- **NVG**– Areal Extent of Non-vegetation Cover Classes
 - (Note: Dead trees and logs are included)

The following attributes are interpreted for each lifeform shown above

Lifeform Percent Canopy Coverage. Column Name: **LFCC**. 3-digit.

- Record the areal extent within the polygon to the nearest 1%.
- The total of all classes must equal 100%

Lifeform Connectivity. Column Name: **LFCon**. 2-character

DA: Disaggregated	SA: Semi-aggregated	AL: Aggregated-Linear	AN: Aggregated-Nonlinear
			
Example: Individual seed- or shelterwood trees. Small rock outcrops in a matrix of conifer vegetation. Each “patch” <1% cover	Example: “Small” contiguous patches of dissimilar lifeform.	Example: Contiguous linear features of dissimilar lifeforms such as roads, powerlines, riparian features, avalanche chutes, ski runs.	Example: “Larger” contiguous patch of dissimilar lifeform.

Note: If there is only one lifeform in the region polygon, Connectivity is Aggregated :**AG**

Land Use Category Column Name: LandUse 3-character		
❖ If land use can be determined, enter the category. If there are more than one, enter the dominant in terms of percent cover		
URB	Urban	buildings, parking lots, irrigated lawns
AG1	Agricultural Cropland, Dry	
AG2	Agricultural Cropland, Irrigated	
AG3	Agricultural Pasture	Can describe polygons with tree cover
AG4	Agricultural Plowed/Cultivated	Ag lands that are bare ground
GVL	Gravel Pits, Mines	
HWY	Paved Roads R/W	Anything in the R/W or clearing limits
RD	Non-paved Roads R/W	Anything in the R/W or clearing limits
EPL	Electric Powerline R/W	
OGI	Oil or Gas Pipeline R/W	
OTH	Other	

Land Use Cover Column Name: LandUse% 3-digit
❖ If a Land Use Category is entered, estimate the aerial extent.
❖ Note: the aerial extent of Land Use cannot exceed the aerial extent of the Lifeform being attributed.

Lifeform Comments – 254 characters max. Record any pertinent lifeform information needed to clarify data fields. Comments may include questionable calls for any data field; problems encountered in photo interpretation; assumptions made during photo interpretation; Note any data fields where your confidence level is less than ideal, or very low.

SUBCLASS DATA

For each Lifeform, the following **subclasses** are identified. Column Name: **Subclass**

Note: More than one identical subclass can be assigned to each Lifeform as long each subclass has a different connectivity attribute. For example: for tree lifeform there can be seedling/saplings – aggregated linear [old skid trails] and seedling/saplings – semi-aggregated [small patches, possibly associated with root rot centers].

*Subclass Column Name: SC 2 or 3-character		
TRE Subclasses -Tree		
VL	Very Large Tree	>20.0" DBH
LT	Large Tree	15.0 to 19.9" DBH
MT	Medium Tree	10.0 to 14.9" DBH
ST	Small Tree	5.0 to 9.9 " DBH
SS	Seedlings/Saplings	<5.0 " DBH
SHR Subclasses - Shrub		
LO	Low Shrub	≤ 6.5 feet
HI	Tall Shrub	> 6.5 feet
GFB Subclasses - Grass/Forb		
PG	Perennial grass/forb	Grass/Forb, also includes moss and lichens
AG	Annual grass	
NVG Subclasses Non-Vegetated		
CLD	Cloud	obscuring photo
SCD	Shadow - Cloud	obscuring photo
STP	Shadow - Topographic	obscuring photo
STR	Shadow - Tree	obscuring photo
RCK	Rock	Includes scree.
BAR	Bare Ground	Includes roads, gravel pits, sandbars
WAT	Water	
SNW	Snow and Ice	Snow and ice on photo and TM imagery
RDT	Recently Dead Trees	With foliage attached – red, orange ,yellow
ODT	Older Dead Trees	Without foliage but retaining branchwood
SNG	Very Old Dead Trees	Boles only, little or no branchwood
LWD	Litter and Down Woody Debris	tree and shrub litter fall, logs. Does not include recently-cured annual or senescent perennial grass-forb
BRN	Recently burned	black on photo and the TM imagery
PAV	Paved Roads	Concrete or blacktop highways
MAN	Man-made structures	Buildings

The following attributes are interpreted for the Subclasses above :

***Subclass Connectivity** Column Name: **SCCon. For All Subclass.** See graphic in Lifeform Section above;

- **DA** – disaggregated
- **SA** – semi-aggregated
- **AL** – aggregated; linear
- **AN** – aggregated; non-linear
- **Note:** If there is only one lifeform in the region polygon, Connectivity is Aggregated :**AG**

Subclass Canopy Cover. Column Name **SCCC**.

For All Subclass, record the Total Percent Canopy Cover. Canopy Covers for all Subclasses must add up to the total canopy Cover for the Lifeform.

Subclass Comments – Record any pertinent information needed to clarify data fields.

Comments may include questionable calls for any data field; problems encountered in photo interpretation; assumptions made during photo interpretation; notes on polygon boundaries.

Note any data fields where your confidence level is less than ideal, or very low.

Species Data by Subclass

Species: Depending on Lifeform/Subclass, record the species or species groups using the following classes **Column Name:** Spp 6-character

Tree Subclass [sizeclass] Species and Group List

Conifers

PICO– Lodgepole Pine
PIPO – Ponderosa Pine
PIMO – Western White Pine
PSME – Douglas-fir
LAOC – Western Larch
ABGR – Grand Fir
ABLA – Subalpine Fir
PIEN – Engelmann Spruce
TSHE– Western Hemlock
THPL– Western Redcedar
TSME – Mountain Hemlock
PIAL – Whitebark Pine
LALY – Alpine Larch
PIFL – Limber Pine
JUSC – Rck Mtn Juniper
TABR - Pacific Yew (tree form)
INCO – Shade Intolerant Conifers
 PICO, PIPO, PIMO, PSME, LAOC,
 PIAL, LALY, PIFL, JUSC
TOCO – Shade Tolerant Conifer
 ABGR, ABLA, PIEN, TSHE, THPL,
 TSME, TABR

Hardwoods

POTR – Quaking Aspen
POBAT– Black Cottonwood
BEPA – Paper Birch
B EGL – Bog Birch
FRPE– Green Ash
ALRU– Red Alder
ALRH– White Alder
INHA – Shade Intolerant Hardwood
 All Hardwoods

Grass/Forb Subclass Species and Group List	
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Use the following classes in any combination of the 'hierarchy'. For example: you could code a GFS subclass - 10%, as GFRIP-7%, and CAREX - 3%

Unknown Grass / Forb	
GFWET	Grass / Forb – Wetland sedge
GFRIP	Grass / Forb - Riparian
GFMES	Grass / Forb - Mesic
GFXER	Grass / Forb - Xeric
GFSUB	Grass / Forb - Subalpine
GFALP	Grass / Forb - Alpine

And / Or

Unknown Grass		Unknown Forb	
GWET	Grass – Wetland sedge	FWET	Forb - Wetland
GRIP	Grass - Riparian	FRIP	Forb - Riparian
GMES	Grass - Mesic	FMES	Forb - Mesic
GXER	Grass - Xeric	FXER	Forb - Xeric
GSUB	Grass - Subalpine	FSUB	Forb - Subalpine
GALP	Grass - Alpine	FALP	Forb - Alpine

Examples of Wetland veg: waterlilies, cattails, pondweed, mint, moss/sphagnum, sedges

And / Or

[illegible]

Shrub Subclass Species and Group List

Unknown Shrub	
SRIP	Shrub - Riparian
SMES	Shrub - Mesic
SXER	Shrub - Xeric
SSUB	Shrub - Subalpine
SALP	Shrub - Alpine

And /Or

Shrubs If a species is not listed below find the correct database abbreviation from the NRCS plant list at http://plants.usda.gov		
ACGL	Rocky mountain maple	Acer glabrum
ALNUS	Alder	Alnus spp.
AMELA	Serviceberry	Amelanchier alnifolia
ARTEM	Sagebrush	Artemisia spp.
ARUV	Bearberry, kinnikinnick	Arctostaphylos uva-ursi
BERBE	Oregon grape	Berberis spp.
BETUL	Birch	Betula spp.
CERCO	Mountain mahogany	Cercocarpus spp.
CESA	Redstem ceanothus	Ceanothus sanguineus
CEVE	Evergreen ceanothus	Ceanothus velutinus
CHRY9	Rabbitbrush	Chrysothamnus spp.
COSEO	American dogwood	Cornus stolonifera
CRATA	Hawthorn	Crataegus spp.
HODI	Oceanspray	Holodiscus discolor
JUCO6	Common juniper	Juniperus communis
LEGL	Labrador tea	Ledum glandulosum
LONIC	Honeysuckle	Lonicera spp.
MEFE	Rusty menziesia	Menziesia ferruginea
PAMY	Oregon boxleaf	Pachistima myrsinites
POFR4	Shrubby cinquefoil	Potentilla fruticosa
PHLE4	Syringa	Philadelphus lewisii
PHYSO	Ninebark	Physocarpus malvaceus
PRUNU	Cherries	Prunus spp.
PUTR2	Antelope bitterbrush	Purshia tridentata
RHAL2	White rhododendron	Rhododendron albiflorum
RHUS	Sumac	Rhus spp.
RIBES	Goosberries/currants	Ribes spp.
ROSA5	Rose	Rosa spp.
RUPA	Thimbleberry	Rubus parviflorus
SALIX	Willow	Salix spp.
SAMBU	Elderberry	Sambucus spp.
SHEPH	Buffaloberry	Shepherdia spp.
SORBU	Mountain ash	Sorbus spp.
SPIRA	Spirea	Spirea spp.
SYAL	Common snowberry	Symphoricarpos spp.
VACCI	Blueberries	Vaccinium spp.
VASC	Grouse whortleberry	Vaccinium scoparium

Canopy Cover by Species or Species Group. Column Name: **SpCC.** 3-digit

Record percent canopy coverage for each species, to the nearest 1%.

Totals must equal total percent Canopy Cover for each subclass [sizeclass] for tree lifeforms.

Species Comments – 254 characters max. Record any pertinent information needed to clarify species data fields.

Note: Grass –vs – Litter

When the current year's recently-cured annual or senescent perennial grass-forb is interpreted from aerial photography, treat it as if it were live, standing vegetation. Code this as GFB and not NVG [non-vegetation]. This will best allow us to relate our PI data to the TM data, which most often acquired while grasses are 'green'.

This may pose some difficult photo interpretation as we attempt to distinguish this year's grass-forb coverage from past years grass-forb coverage incorporated into the litter layer – which for our PI procedures is NVG-LWD [litter].

This is different than how we deal with dead trees and logs, which we class as NVG-LWD, regardless on how long they have been dead, one year or many

Appendix A: Model Number / Forest Number Coverage Name

MNIA	Model No	Image Analyst	Approx. Acres – including buffer.
0110	1	Bachurski	3,700,265
0114	1	Triepke	97,725
0116	1	Menkens	136,084
			3,934,074
0210	2	Bachurski	2,263,152
0214	2	Triepke	515,228
0216	2	Menkens	314,212
			3,092,592
0304	3	Grover	235,787
0305	3	Weston	1,265,902
0310	3	Bachurski	68,120
0316	3	Menkens	1,720,710
			3,290,519
0403	4	Gmelin	3,573,520
Note:	0403 includes	much of the Lolo	
0503	5	Gmelin	593,710
0505	5	Weston	727,730
0517	5	McDonald	2,151,279
			3,472,719
0704	7	Grover	978,007
0710	7	Bachurski	1,521,986
0714	7	Triepke	2,784,458
0716	7	Menkens	313,145
			5,597,596
0804	8	Grover	3,082,672
0805	8	Weston	2,258,583
0814	8	Triepke	371,928
0816	8	Menkens	1,394,143
			7,107,326
0905	9	Weston	1,667,293
0917	9	McDonald	1,316,430
			2,983,723
1005	10	Weston	388,254
1017	10	McDonald	1,841,166
			2,229,420
1104	11	Grover	2,160,630
1204	12	Grover	590,408
1214	12	Triepke	1,202,151
			1,792,559
1304	13	Grover	2,140,092
1305	13	Weston	886,943
1314	13	Triepke	127,117
			3,154,152
	Total	Acres	43,823,679

Appendix A1: Model Number / Forest Number Coverage Name

For evaluation of 1:5500 photography in IPNF Pilot Area by Barb Young.
Subset of Model 11 region_polygons that are intersected by a 70-meter
buffer around each CVS plot and within 600 meters of an open road.

1196	11	Young	PI#1 1:5500 with existing data
1197	11	Young	PI#2 1:5500 with CVS data
1198	11	Young	PI#3 1:15840 with existing data
1199	11	Young	PI#4 1:5500 digital/stereo analyst with existing data and.

Appendix B – “Ownership” Codes

Code	“Owner” – National Forest	Code	Owner – Non-NF
03	Bitterroot	50	Flathead Indian Reservation
04	Idaho Panhandle NFs	51	Nez Perce Indian Reservation
05	Clearwater	61	Glacier NP
10	Flathead	62	BLM
14	Kootenai	63	Fish Wildlife Service
16	Lolo	69	Other Federal
17	Nez Perce	71	Montana State
		72	Idaho State
		81	Industrial Timber Lands
		82	Small Private

Appendix C - R1-VMP “Numbering and Naming Conventions/Relationships”

Note: reference to MNIA needs to be changed to MNFN

	Coverage Name Or GIS_Link	Polygon_Link Grid-Code Polygon_id	Reg	For	Dist	“Model No. /Image Analyst” ID or CSE Location	Reference Data Region-Polygon No. [RPN] or Stand Number	Plot or Level_1_id	Other Stuff
R1-VMP Models Grid and Polygon Coverages [N=13]	Coverage Name MN_grid and MN_poly MN=Model No.	All <u>Regions & Polygons</u> Grid_codes same as Polygon #s n-char.							Values for each polygon: TM values –mean, max,min, std. dev.; topo values – slope, aspect, elev; etc. etc. etc.
R1-VMP PI Reference Data Polygon Vector Coverages [N=41 ea]	Coverage Name MNIA_poly MN=Model No. IA=Image Analyst	All Polygons Polygon # Same as above n-char.				“Model No. /Image Analyst” ID [MNIA] [41 unique values - see Table next page] 4-character	Ref. Data Region- Polygon No. Region-Polygon Selected and No. Assigned by IA 3-digit		In the event we PI >999 region- polygons in one “Model/Image Analyst” coverage, create new coverage and add 50 to Model Number. See Table Below.
R1-VMP PI Ref. Data Access Database	Coverage Name MNIA_poly MN=Model No. IA=Image Analyst	Polygon_Link		For 2- digit	Dist 2- digit	“Model No. /Image Analyst” ID [MNIA] 4-character	Ref. Data Region- Polygon No. [From above] 3-digit	Plot No. of plots is assigned by IA 2-char	See PI Data Collection Guide for additional data.
R1-VMP CSE Field Data Recorder			Reg 2- digit	For 2- digit	Dist 2- digit	CSE Location = “9” + Model No./ Image Analyst ID [MNIA] 5-digit [to distinguish from 4-digit TSMRS comp/subcomp]	CSE Stand = Ref. Data Region-Polygon No.. 4-digit max only use 3 due to limitations in Garmin	Plot Use only 2- digit due to Garmin limits	See CSE Field Guide for R1 Attributes
FSVeg	GIS_Link = Setting and Plot Coverage Name: VMP_MNIA_poly VMP_MNIA_plot MN=Model No. IA=Image Analyst 26-character		Reg 2- digit	For 2- digit	Dist 2- digit	CSE Location = “9” + Model No./ Image Analyst ID [9MNIA] 5-digit [9XXXX] [to distinguish from 4-digit TSMRS comp/subcomp]	CSE Stand = Ref. Data Region- Polygon No. 4-digit max only use 3 due to limitations in Garmin	Plot [Level_1_id] Use only 2- digit due to Garmin limits	See FSVeg Data Dictionary.
R1-VMP Field Sample Plot Coverages [N=31]	Coverage Name VMPMNIA_plot MN=Model No. IA=Image Analyst	Point # n-char.				Model No./ Image Analyst ID [MNIA] 4-character	A or N + Ref Data Region-Polygon No. 4-character	Plot no. 2-char.	
Garmin			Need to be extremely careful and get these acquired waypoints associated with the right “MNIA_plot” coverage. May get confusing in the overlaps between Models!!				A or N + Ref Data Region-Polygon No. A = “acquired” N = “navigate” 4-character	Plot no. 2-character	Filename 6-character max.

Northern Region Vegetation Mapping Project Photo Interpretation Guide “Quick-Interp”

Version 4, 5/21/03

Model Number / Forest Number Coverage Name. Column Name: MNFN. 4-digit
Photo Interpreter Column Name: PI 3 characters <ul style="list-style-type: none"> Record Photo Interpreter's Initials [either 2 or 3 characters]
Polygon_link. Column Name: Poly_link. 6-digit. <ul style="list-style-type: none"> Record Polygon_link from the Model / Image Analyst Polygon Coverage. .
Flag Column Name: Flag 1 digit <ul style="list-style-type: none"> 0 = no flag 1 = flag -- discrepancy between photo and TM imagery. <ul style="list-style-type: none"> For example: green, live trees on photo and recent burned or harvest on TM imagery. Make note of condition in General Comments If a poly-link is flagged, it is not photo-interpreted and therefore RPN is not needed. 2 = flag – discrepancy likely between photo and TM imagery due to anticipated insect and pathogen related mortality. See notes on page 20-21. 3-7=reserved flags. 8-9=image analyst flags that can be used at their discretion
Reference Data Region-Polygon Number. Column Name: RPN. 4-digit <ul style="list-style-type: none"> Consecutive number [1-9,999] assigned by Image Analyst to those region-polygons selected for photo interpretation
Owner. Column Name: Own. 2-digit. Attributed by GIS routine <ul style="list-style-type: none"> Record 2-digit traditional National Forest identifier or R1-VMP code for 'other ownership' See Appendix B
District. Column Name: Dist. 2-digit Attributed by GIS routine <ul style="list-style-type: none"> Record 2-digit Ranger District identifier for National Forest lands
Aerial Photo Identification. Column Name: API. 17 characters. <ul style="list-style-type: none"> Record the photo that covers the majority of the region polygon. No spaces in code. <ul style="list-style-type: none"> First six numbers represent Photo Symbol/Project ID Next four numbers represent the roll number Next four numbers represent the exposure number Last three numbers represents the flight line number, use at the discretion of the Image Analyst
Photo Scale: Column Name: PS 2 characters <ul style="list-style-type: none"> Record the nominal photo scale using the following convention: <ul style="list-style-type: none"> 1:16,000 code as 16 1:5,000 code as 5
DOQQ Quadrangle: Column Name: Quad 20 characters <ul style="list-style-type: none"> Optional – note name of quad.

Manual Classification Code Column Name: **MCC** 3 characters

Interpretation of TM data only where region consists nearly 100% of the following classes:

Use this field and the codes below to identify poly_links that can be used to assist in manual classification of non-forested types. If these codes are used, stop data entry after this field.

CLD	Cloud	
SCD	Shadow - Cloud	
STP	Shadow - Topographic	
RCK	Rock	Includes scree.
BAR	Bare Ground	Includes gravel pits, sandbars
WAT	Water	
SNW	Snow and Ice	
RDT	Recently Dead Trees	With foliage attached – red, orange ,yellow
BRN	Recently burned	
RDS	Gravel & native surface roads	
PAV	Paved Roads	Concrete or blacktop highways
MAN	Man-made structures	Buildings

Inventory Data Type.

Column Name: **IDT**. 2 characters.

- Record the type of data used to assist in the photo interpretation
- 0. No Data
- 11. R1 Standard Exam or Quick Plot
- 12. R1 PGP
- 13. R1 Other
- 14. R1VMP-CSE field data
- 15. ECODATA plant comp data
- 16. ECODATA tree data
- 17. FIA
- 18. IPNF CVS
- 19. IPSAC training data – ground and helicopter
- 20. Image Analyst Walk-thru, Drive-by
- 53. Flathead Indian Reservation
- 54. Nez Perce Indian Reservation
- 55.
- 65. GNP Veg Mapping Project
- 66. BLM
- 67. FWS
- 68. Other Federal
- 73. Montana State
- 74. Idaho State

Note: if multiple data types are available, code the one judged to be 'best'.

Inventory Data Identifier. aka setting-id

Column Name: **IDI**.

- Record the stand or plot number associated with the reference data.
Format as follows
- 0 NoData
- FS Veg 14 characters
- ECODATA XX characters
- FIA data XX characters
- IPSAC data XX characters
- IPNF CVS data XX characters
- GNP VMP data XX characters
- Other measured data XX characters
- Walk-thru, Drive-by Person's Last Name

LIFEFORM DATA

Lifeform Column Name: **LF**. 3-characters. Identify the lifeform.

- A. Tree lifeform $\geq 10\%$ canopy cover **TRE**
- A. Tree lifeform $< 10\%$ canopy cover.....Go to B
- B. Shrub lifeform $\geq 10\%$ canopy cover**SHR**
- B. Shrub lifeform $< 10\%$ canopy cover.....Go to C
- C. Grass/Forb lifeform $\geq 10\%$ canopy cover **GFB**
- C. Grass/Forb lifeform $< 10\%$ canopy cover.....Go to D
- D. TRE+SHR+GFB+non-vascular $\geq 10\%$ canopy cover**NDL** [no dominant lifeform]
- D. TRE+SHR+GFB+non-vascular $< 10\%$Go to E
- E. TRE+SHR+GFB+non-vascular $< 10\%$ and $\geq 1\%$ canopy cov...**SVG** [sparsely vegetated]
- E. TRE+SHR+GFB+non-vascular $< 1\%$**NVG** [non-vegetated]

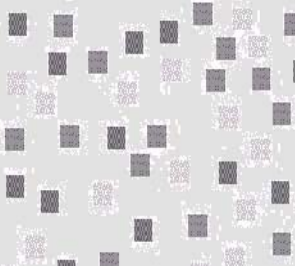

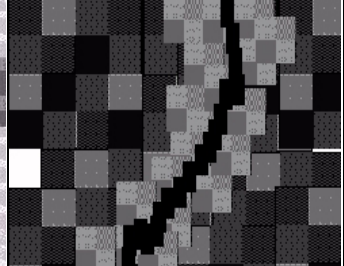

Lifeform Code Column Name: **LFC**. 1-character. **Optional Use.**

This field can be hidden during data entry, populated with an update query at a later date, converted to a .dbf and joined to region_polygon coverage for use with eCognition.

1	TRE – Tree
2	SHR – Shrub
3	GFB – Grass / Forb
4	NDL – No Dominant Lifeform
5	SVG – Sparsely Vegetated
6	NVG – Non-vegetated

Lifeform Connectivity. Column Name: **LFCon**. 2-character

- Identify the connectivity of the lifeform above.

DA: Disaggregated	SA: Semi-aggregated	AL: Aggregated-Linear	AN: Aggregated-Nonlinear
			
Example: Each “patch” $< 1\%$ cover	Example: “Small” contiguous patches of dissimilar lifeform.	Example: Contiguous linear features of dissimilar lifeforms such as roads, powerlines, riparian features, avalanche chutes, ski runs.	Example: “Larger” contiguous patch of dissimilar lifeform.

Tree Sizeclass Canopy Cover. Column Names **See Below** 2-digits

Estimate canopy cover for each of the 5 classes below, zero fill any classes without trees.

- Estimate canopy cover to the nearest 1% for sizeclasses that are < 10%.
- You **may** estimate canopy cover to the nearest 5% for sizeclasses with canopy cover \geq 10%.
- Insure that the total of all sizeclasses represents the total canopy coverage for the polygon.
- Insure that for polygons identified as Tree Lifeform that the total of all sizeclasses \geq 10% and that for polygons not identified as Tree Lifeform that the total of all sizeclasses < 10%

TLFC	Tree Lifeform Canopy Cover	All sizes
VLCC	Very Large Tree Canopy Cover	>20.0' dbh
LTCC	Large Tree Canopy Cover	15.0-19.9" dbh
MTCC	Medium Tree Canopy Cover	10.0-14.9" dbh
STCC	Small Tree Canopy Cover	5.0-9.9" dbh
SSCC	Seedlings/Saplings Canopy Cover	<5.0" dbh

Tree Dominance Type 1 Column Name **Dom_1** 14-characters

Based on photo interpretation of canopy cover

For schematic of this dichotomous key see Appendix

Use common four-letter abbreviations for species, such as PIPO, PICO, ABLA for single-, two- and three-species mixes

- A.** Single most abundant species \geq 60% of total canopy cover..... **List single species**
- A.** Single most abundant species < 60% of total canopy cover..... Go to B
- B.** 2 most abundant species \geq 80% of total canopy cover and each species individually is \geq 20% of total canopy cover**List 2 species**, in order of abundance
- B.** 2 most abundant species < 80% of total canopy cover..... Go to C
- C.** 3 most abundant species \geq 80% of total canopy cover and each species individually is \geq 20% of total canopy cover**List 3 species**, in order of abundance
- C.** 3 most abundant species < 80% of total canopy cover..... Go to D
- D.** Shade intolerant species total CC \geq shade tolerant species total CC.....**IMXS**
- D.** Shade intolerant species total CC < shade tolerant species total CC.....Go to E
- E.** GF+C+WH canopy cover \geq AF+S+MH canopy cover**TGCH**
- E.** GF+C+WH canopy cover < AF+S+MH canopy cover**TASH**

Tree Dominance Type 3 Column Name **Dom_3** 9-characters

For dominance types identified as 3 species above, re-assign them to one of the 3 “mixed species” classes also above.

IMXS - shade intolerant mix

TASH - shade tolerant subalpine fir, spruce and mountain hemlock

TGCH - shade tolerant grand fir, cedar, western hemlock

For example a 3-species label of ABLA/PSME/PICO needs to be assigned to either IMXS or TASH. In the situation where ABLA is 41% and the PSME and PICO both are 21%, the remaining 17% will determine the label. If it is PIEN the label will be TASH. If it is LAOC the label will be IMXS.

The single-species, two-species and mixed-species classes will be populated with an update query later and should not be populated by the photo-interpreter

Shrub Lifeform Canopy Cover Class Column Name: **SHR_CC**. 6-character
Total canopy cover of all trees, expressed as percent of the region-polygon

0
1-9
10-24
25-40
40-59
60-100

Shrub Lifeform Canopy Cover Class Code Column Name: **SLFC**. 1-character
This field can be hidden during data entry, populated with an update query at a later date, converted to a .dbf and joined to region_polygon coverage for use with eCognition.

0	0%
1	1-9%
2	10-24%
3	25-40%
4	40-59%
5	60-100%

Shrub Dominant Class Column Name: **SDom**. 5-characters

SRIP	Shrub - Riparian
SMES	Shrub - Mesic
SXER	Shrub - Xeric
SSUB	Shrub - Subalpine
SALP	Shrub - Alpine

Grass / Forb Lifeform Canopy Cover Class Column Name: GFB_CC . 6-character Total canopy cover of all trees, expressed as percent of the region-polygon	
0	
1-9	
10-24	
25-40	
40-59	
60-100	

Grass / Forb Lifeform Canopy Cover Class Code Column Name: GLFC . 1-character This field can be hidden during data entry, populated with an update query at a later date, converted to a .dbf and joined to region_polygon coverage for use with eCognition.	
0	0%
1	1-9%
2	10-24%
3	25-40%
4	40-59%
5	60-100%

Grass / Forb Dominant Class Column Name: SDom . 5-characters	
GFWET	Grass / Forb – Wetland
GFRIP	Grass / Forb - Riparian
GFMES	Grass / Forb - Mesic
GFXER	Grass / Forb - Xeric
GFSUB	Grass / Forb - Subalpine
GFALP	Grass / Forb - Alpine

Non-Veg Lifeform Canopy Cover Class Column Name: **NVG_CC**. 6-character
Total canopy cover of all trees, expressed as percent of the region-polygon

0
1-9
10-24
25-40
40-59
60-100

Non-Veg Lifeform Canopy Cover Class Code Column Name: **NLFC**. 1-character
This field can be hidden during data entry, populated with an update query at a later date, converted to a .dbf and joined to region_polygon coverage for use with eCognition.

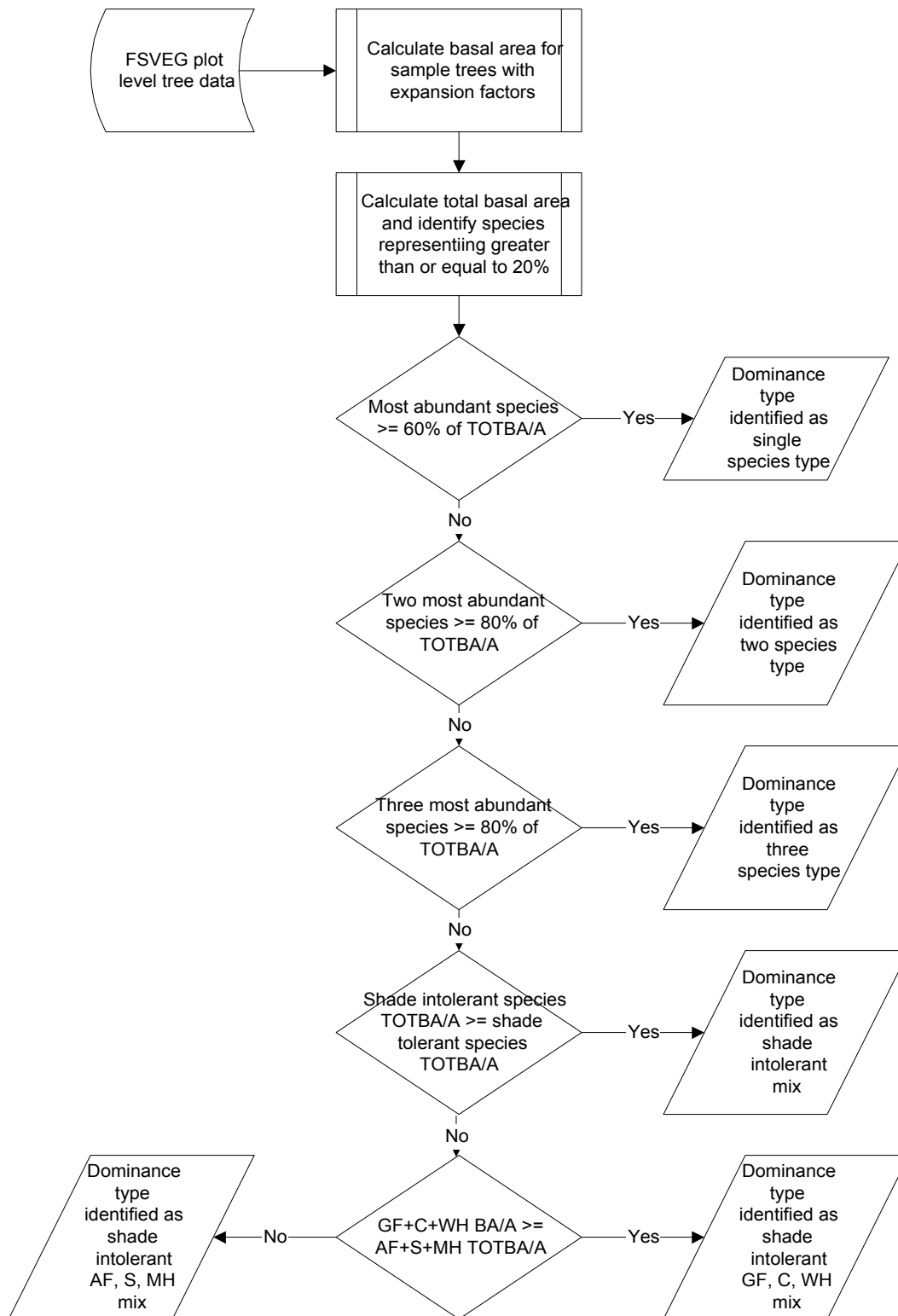
0	0%
1	1-9%
2	10-24%
3	25-40%
4	40-59%
5	60-100%

NVG Dominance Classes Column Name: **NDom**. 4-characters
Select the most dominant type based on photo interpretation. Independent from TM imagery.

RCK	Rock	Includes scree.
BAR	Bare Ground	Includes gravel pits, sandbars
WAT	Water	
SNW	Snow and Ice	
RDT	Recently Dead Trees	With foliage attached – red, orange ,yellow
ODT	Older Dead Trees	Without foliage but retaining branchwood
SNG	Very Old Dead Trees	Boles only, little or no branchwood
LWD	Litter and Down Woody Debris	tree and shrub litter fall, logs. Does not include recently-cured annual or senescent perennial grass-forb
BRN	Recently burned	
RD	Non-paved roads	Native surface and gravel roads
PAV	Paved Roads	Concrete or blacktop highways
MAN	Man-made structures	Buildings

General Comments – 254 characters max. Record any pertinent general information. Such as: region polygon “delineation” concerns, remarks regarding region polygon variability and how it might affect field sampling, concerns related to Reference Data, etc

Dominance Type Classification Logic



Northern Region Vegetation Mapping Project

FSVeg Data Evaluation Guide

“PI_LITE”

Version 1.1B Updated 3/26/03

* denotes primary key in MS Access database.

<p>*Model Number/Forest Number. Column Name: MNFN. 4-digit</p> <ul style="list-style-type: none"> See Appendix A
<p>*Photo Interpreter Column Name: PI 3 characters</p> <ul style="list-style-type: none"> Record Photo Interpreter's Initials [3 characters]
<p>*Polygon_link. Column Name: Poly_link. 6-digit.</p> <ul style="list-style-type: none"> Record Polygon_link from the MNFN Polygon Coverage. .
<p>*Reference Data Region-Polygon Number. Column Name: RPN. 3-digit</p> <ul style="list-style-type: none"> Consecutive number [1-999] assigned by FSVeg Evaluator to those region-polygons selected for assigning tree canopy coverage class, tree dominance type and tree sizeclass, If more than 999 region-polygons are assigned labels, then create a copy of the Model Number/Forest Number Coverage, increment the Model Number [MN] by 50 and start again.
<p>Setting ID. Column Name: Setting Id. 14 character.</p> <ul style="list-style-type: none"> Record the stand number associated with the R1-VMP region-polygon.
<p>Tree Canopy Coverage Class. Column Name: Tree_CC. 3-digit.</p> <p>Estimate the canopy coverage of trees and put in one of the following classes.</p> <p>0-9% (non-tree)</p> <p>10-24% (sparse)</p> <p>25-59% (open)</p> <p>60-100% (dense)</p> <p>*See information provided in table associated with TSMRS stand GIS coverage</p>

Dominance Type. Column Name: DomType. 14 character: AAAA-BBBB-CCCC	
Up to 3 species combinations are allowed Use labels contained in the table associated with TSMRS stand GIS coverage	
Conifers PICO – Lodgepole Pine PIPO – Ponderosa Pine PIMO – Western White Pine PSME – Douglas-fir LAOC – Western Larch ABGR – Grand Fir ABLA – Subalpine Fir PIEN – Engelmann Spruce TSHE – Western Hemlock THPL – Western Redcedar TSME – Mountain Hemlock PIAL – Whitebark Pine LALY – Alpine Larch PIFL – Limber Pine JUSC – Rck Mtn Juniper TABR - Pacific Yew (tree form)	Hardwoods POTR – Quaking Aspen POBAT – Black Cottonwood BEPA – Paper Birch B EGL – Bog Birch FRPE – Green Ash ALRU – Red Alder ALRH – White Alder Mixed Species IMXS – Shade Intolerant Mixed Species PICO, PIPO, PIMO, PSME, LAOC, PIAL, LALY, PIFL, JUSC, All Hardwoods TMXS – Shade Tolerant Mixed Species: All THPL, TSHE, ABGR, ABLA, PIEN, TSME, TABR - OR - TGCH – Shade Tolerant: cedar, w. hemlock, grand fir THPL, TSHE, ABGR, TASH – Shade Tolerant: subalpine fir, spruce, m. hemlock ABLA, PIEN, TSME, TABR

Tree Sizeclass Column Name: SizeClass 5-characters Use labels contained in the table associated with the TSMRS stand GIS coverage	
Class 0-5 5-10 10-15 15-20 20+	Definition 0.0 – 4.9 inches dbh 5.0 – 9.9 inches dbh 10.0-14.9 inches dbh 15.0-19.9 inches dbh 20.0 and greater inches dbh
Digital Ortho Quadrangle Name. Column Name: Quad 50 characters	
General Comments – 254 characters max. Record any pertinent <u>general</u> information.	

Appendix B, PI Guide - Exhibit 4

Aerial Photo Interpretation Techniques for Northern Idaho and Western Montana.

Compiled by Tracy Grover for R1VMP Image Interpretation Team

Edited by Doug Berglund

Interpreting 1:15,840 aerial photography for Vegetation Cover

Interpreting mid-scale aerial photography for use in developing training set data for a vegetation cover can be considered a mix of science and art. The scale of the photography, while affordable for forest-wide use, is perhaps not the optimal for determining species and size class of trees, shrubs and herbs. To the untrained eye, the photos have limited information. R1-VMP Image Analysts use the sciences of botany, forestry, and silviculture as well as local field experience and historical knowledge of the area to aid in recognizing subtle differences indicative of the variations in subclasses. With the addition of expert knowledge, the photos become a viable source for providing reference data for classification of forest vegetation.

Listed are several broad categories of techniques for photo interpretation:

General Tips

Crown reflectance, color and texture

Crown profiles or shadows

Stand patterns and textures

Landform and moisture indicators

General tips are used to develop a consistent approach to a new photo or region polygon. Crown reflectance, color, texture and shadow are guides to interpreting. Expert knowledge and field experience are most heavily used in conjunction with these. Profiles and shadows are often key to species interpretation and are more easily recognizable. Stand patterns are often species-based and become recognizable with experience.

Landform and moisture indicators are well-documented factors in lifeform classes and can be best learned through habitat typing documentation. Rough guidelines for northern Idaho species are included here but see Cooper, Neiman, and Roberts; 1991, *Forest Habitat Types of Northern Idaho: A Second Approximation* for a detailed schema. In Montana use Pfister, et al., 1977, *Forest Habitat Types of Montana*.

General Tips

Visual “calibration”

Look to the adjacent areas within the photo for isolated trees for typing to species (for example, a lone larch tree surrounded by grasses, forbs, and low shrubs). Then return to the polygon region and see if larch can be identified within. This also allows the analyst to use a parallax wedge for height determination and relative height estimation before viewing dense crown closure. Recognize habitat terrain changes before assuming species distribution.

Build a portfolio of color Xeroxed stereo examples of size, density and type for visual calibration. These training or reference sets should be checked periodically, if not daily, to stay keyed to the ‘known’ This is especially important for height and canopy cover classing.

Lighting

Vary the light source and/or light spectrum to attain higher contrast of features. Natural light is helpful while full spectrum bulbs are potentially helpful. Two incandescent lamps with 100-watt bulbs provide full, good lighting.

Conversely, some interpreters prefer placing photo pairs on a light table without an overhead light source. This technique contrasts the color of the understory versus shadows.

Stereo versus single lens viewing

Vary the lens power for a different perspective. Switching between a 4X and a 7X power magnification reveals different information even when a more clear focus is not possible at the scale of your photo. This can also alter or expand your field of vision giving more information on surrounding vegetation.

Always use stereo to obtain lifeform connectivity and lifeform canopy cover. For percentages, make a mental image by grouping and put into a corner all like subclasses before estimating relative area. Then compare area to the total.

Always double check species with a single hi power lens.

Other photo factors

If the area is visible on more than one pair of stereo photos, view them alternately for more perspective.

Make use of photo edges if possible; while distortion occurs off nadir, the trees can be easily seen in profile. Distortion at the edges can alter tree shape, height, color, and silhouette so take care in this area.

Crown reflectance, color and texture

Color

Certain species have general color or brightness signatures when compared to other vegetation within the same photo. Different surveys will produce photos with different hues or contrast so these guidelines work best within a single photo. Colors can also vary depending on the context of the species occurrence. Light reddish hue across an area usually indicates distress from disease, pests, or drought, while lone red trees are likely dying. Larger areas of snags (Litter, woody debris, snags) will give a gray hue.

For grass; dead or mature grass may appear brown and can be confused with litter or woody duff.

Texture

Smoother areas may indicate homogeneity; either same size class and/or same species. Species identification may have to be determined by other factors.

- Larch – Look for a higher reflectance (i.e. brighter or lighter) than the surrounding trees. They often appear fuzzy, disorganized, or dispersed in plan view.
- Lodgepole – If the dominant species is lodgepole pine and roughly the same age, these areas will look like a smooth carpeted surface. Color appears purple or dark red relative to the adjacent species. A warning: dense, pole-sized Douglas-fir will look similar to lodgepole.
- Western redcedar – May have a slightly copper-looking color in comparison to surrounding trees.
- Grand fir – May appear darker green relative to neighboring trees.
- Western hemlock – May also appear a darker green aerially than its neighbors with the exception of grand fir.
- Douglas-fir – Looks dark red relative to the adjacent species. Douglas-fir can also have a silvery blue hue when it occurs in areas w/ lots of grand fir. Appears light green, almost lime green color when it occurs w/ lesser amounts of grand fir along with western redcedar.
- Perennial Grass – Cheat grass will display a white sheen by August.

Green intensity, in general:

GF > DF > LP > WL

AF/ES >> LP

C+GF > DF

With GF having the darkest green shading to a light green WL.

Litter and woody duff can appear similar to brown (living or dead) grasses.

Crown profiles or shadows

Crown profile or the shadows they cast can often help determine tree species. See *How to Use Aerial Photographs in Natural Resource Applications* page 13-14 for vertical crown shape and shadows and *Field Guide to Forest Plants of Idaho* for crown morphology. Shape can help narrow down the choices for type but care should be taken; distortion can occur from dense growth, storms, snow burden, disease, etc. These distortions will remain after thinning or a harvest leaving misleading crown profiles. Always remember to mentally catalog the age of the trees; crown shape and diameter can be altered by weather and vegetation density through time.

- subalpine fir – conic and sharp edged, the narrow crown normally reaches low.
- Ponderosa pine – Rounded with a high crown. Appears to have billowy edges.
- Douglas-fir – Conic but somewhat wider than the spruce and much wider than subalpine fir.
- Grand fir – similar in shape to the Douglas-fir only with a convex, high crown. GF you can

generally see the dark point at the top, and the shape of the tree is very conical.

- Larch - Shadow outline is less well defined and the crown appears diffused.
- Cedar – Smaller crowns or if large, cylindrical, rounded tips.
- Paper birch – Rounded multiple crowns.
- Aspen – Either small or rounded open crowns.

Stand patterns and textures

Aggregation, or patterns of growth and spatial distribution, can indicate the species for homogenous stands. Fire or other stand replacing events can alter natural distributions so, once again; use the following as general guidelines.

- Paper birch – Tend to grow in clumps
- Aspen – Generally not clumped .
- Lodgepole – Single species or dominant species stands render a smooth, carpet-like texture.
- Spruce/subalpine fir – Can produce dense stands but can also often have a high degree of spacing between trees in a very mature stand.
- Ponderosa pine – Medium to coarse stands in open areas.

Landform and moisture indicators

Most species have preferential growth under specific climatic conditions, slope, aspect, surface moisture, elevation, and other landform parameters. Refer to *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper, Neiman, and Roberts; 1991) or *Biophysical Classification; Habitat Groups and Descriptions* (Zack and others, 1997) for detailed discussions of habitat parameters and tree, shrub, forb and grass assemblage.

Literature Cited

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Recommended Reading

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